3.6.P20

Compositional evolution of magmatic volatiles in mineralized alkaline intrusions in the Ailaoshan-Jinshajiang belt, Western Yunnan, China

BI XIANWU[1], HU RUIZHONG[1], J.J. HANLEY[2], J.E. MUNGALL [2], PPENG JIANTANG[1]

[1] Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, China (xwbi@163.com)
[2] Department of Geology, University of Toronto, Toronto, Canada

The NW-NNW trending Ailaoshan-Jinshajiang fault zone is one of the biggest strike-slip systems on Earth related to escape tectonics from the India-Eurasia collision since the early Himalayan orogeny. Numerous alkaline igneous rocks occur along or near the fault zone, forming a magmatic belt (Ailaoshan-Jinshajiang alkaline intrusive belt) over 1000 km long and generally 50-80 km wide. Geochemically, these alkaline intrusive rocks show ultra-potassic or shoshonitic character and incompatible trace element variation patterns, with highly enriched large-ion lithophile elements, light rare earth elements, and depleted high field strength elements. Isotopically, their Sr-Nd compositions lie close to the range for type α enriched mantle. The above features support the origin of these alkaline magmas from a metasomatized lithospheric-mantle which was previously contaminated by subducted oceanic slab. In recent years numerous gold deposits and copper deposits have been discovered in the area, which are spatially related to and contemporaneous with these alkaline intrusions. The recent researches showed that there are genetic connections between alkaline magmatism and mineralzation [1].

In this work, two alkaline intrusions in the belt, the Yao'an syenite porphyry associated with Au mineralization and the Machangqing granitic porphyry related to Cu mineralzation, were examined, to demonstrate the possible difference of the volatile contents between gold- and copper-associated intrusions. The authors analyzed the halogens of biotite and apatite from these two intrusions, which show that fluorine of biotites in the Yao'an intrusion ranges from 2.22 to 4.15 wt%, chlorine ranges from 0.18 to 0.23 wt%. Fluorine of apatite from the Yao'an intrusion around 2.46 to 3.93 wt%, while chlorine fall in the range 0.19 to 0.54 wt%. The fluorine and chlorine in the gold-associated intrusion are much higher than those in the copper-associated Machangqing intrusion (F: 0.52-2.22wt%, Cl: 0.05-0.17wt% in biotites; F: 2.23-3.81wt%, Cl: 0.03-0.08wt% in apatite).

References

[1] Bi XW, Cornell, DH, Hu RZ (2002) *Ore Geology Review* **19**, 69-78.

3.6.P21

Nobel gas isotopes and fluid inclusion studies of PGE-polymetallic deposits in Lower Cambrian black shale, South China

X. SUN, M. WANG, T. XUE AND M. MA

Department of Earth Sciences, Sun Yat-sen University, Guangzhou 510275, China (eessxm@zsu.edu.cn)

Nobel gas isotopic compositions of fluid inclusions trapped in pyrites from some representative PGE-polymetallic deposits in Lower Cambrian black rock series outcropped in south China were analyzed. The results show that the ore-forming fluids possess a low $^3He/^4He$ ratio, varying from 0.43×10^{-8} to 26.39×10^{-8}, with corresponding R/R_a value of 0.003~0.189. The $^{40}Ar/^{36}Ar$ ratios are 258~287, closing to these of air-saturated water (ASW). He-Ar isotopic indicator studies show that the ore-forming fluids were mainly derived from formation water or basinal hot brine and sea water, while the content of mantle-derived fluid or deep-derived magmatic water might be negligible.

Systematically fluid inclusion studies also demonstrate that the ore-forming fluids of the PGE-polymetallic ores are composed mainly of basinal hot brines with medium to high salinity (>25Wt%NaCl*eq*) and air-saturated water with low salinity (<5Wt%NaCl*eq*). Homogenization temperatures of the fluid inclusions are mostly 150~200° C. Characters of fluid inclusions in carbonate-quartz stockworks underlay the Ni-Mo-PGE ore layers are nearly same as those in the ores.

We proposed that the PGE-polymetallic mineralization might be related to evolution of Caledonian miogeosynclines distributed along southern margin of the Yangtze Craton. During the Early Cambrian Epoch, the formation water or basinal hot brine trapped in the Caledonian basins which accumulated giant thick sediments was expelled and migrated laterally along strata because of the pressure generated by overlying sediments. The basinal hot brine ascended along faults, mixed with sea water, and finally deposited Ni-Mo-PGE ores in the black shale.

Acknowledgements

This work was jointly supported by Natural Sciences Foundation of China (No. 40173025, 49928201) and Trans-century Training Program Foundation for the Talents by the Ministry of Education of China.